of the head size and thickness of the leaves, he had Miss Ann Morrill make a cytological study of the material. The pollen proved to be normal and the chromosome number was normal for the species.

Material Studied: Massachusetts, Essex County: from clone of original plant, garden of Francis Wade, Ipswich, *S. K. Harris ,13982* 4 October 1957 (TYPE in GH; isotype in NEBC); garden, Ipswich, Francis Wade 20 September 1954 (NEBC); near parking lot of Crane Beach Reservation, Ipswich, *S. K. Harris 13872,* 27 September 1957 (NEBC). STUART K. HARRIS, BOSTON UNIVERSITY.

EVOLUTION OF FLOWERING PLANTS.—According to legend, the Ostrich, when frightened, buries its head in the sand, apparently reasoning that what cannot be seen or heard has no reality. In human affairs this is the sort of attitude that continually harks back to the "good old days," forgetting the open sewers, the tainted meat, and the little children choking with Diphtheria. Needless to say, there should be no tolerance, in Science, of Ostrich reasoning. In Biology, the increase of factual knowledge, in both the observational and experimental fields, of late years, has been truly remarkable. In many cases, however, theoretical considerations have not kept pace with the increase in factual data, with the unfortunate result that some biologists persist in trying to square the modern corpus of knowledge with theories that were none too happily contrived fifty or one hundred years ago. Indeed, perhaps the most serious deficiency in contemporary biology is the absence of a sober, impartial, encyclopedic, evaluation and correlation of the facts available in the fields of genetics, ecology, comparative morphology, and taxonomy.

A short time ago there was published a book entitled "Features of Evolution in the Flowering Plants."[1] The author is Ronald Good, a well known phytogeographer, and Professor of Botany at the University of Hull (England). On first glance, the book makes an extremely good impression, for it is simply and clearly written, and replete with examples and tastefully produced illustrations. A second look, however, shows that the book is fifty years out of date. The author has chosen to ignore most of the modern data of taxonomy, comparative morphology, and genetics. In doing so, he has not only denied himself the answers to many of his questions (or at least what answers may be available), but he has also denied himself the data necessary to frame his questions meaningfully.

As a plant geographer, the author seems to have picked up a nodding acquaintance with a great variety of species of flowering plants—and with a number of currently unpopular hypotheses about the mechanism of evolution. Unfortunately, it frequently appears that he does not have

[1] Longmans, Green & Co., London and New York, 1956, 30 shillings.

intimate, first-hand acquaintance with the data which he uses. What is worse, however, he seems not to have used all of the available sources of information. No discussion of the relationships of the monocotyledons and dicotyledons, for example, can have much significance if it ignores our present knowledge of the vegetative anatomy of the two groups—based particularly on the recent work of I. W. Bailey and his collaborators at Harvard, V. I. Cheadle at the University of California, and C. R. Metcalfe at Kew. Neither can any discussion of the interrelationships of the higher dicots have much relevancy unless it takes into account the work of A. J. Eames and his students at Cornell. Finally, any discussion of the evolution of the Compositae or Gramineae should consider the genetic studies of Babcock and Stebbins, and their respective collaborators, at the University of California.

Good's main contention seems to be that evolutionary thought is too much dominated by the results of statistical analyses of animal populations, or by *a priori* axioms, and not by demonstrable facts. It is true that much of our knowledge of the behavior of structural characters in populations is derived from the study of laboratory cultures of the fruit fly, Drosophila. One of the values of these tiny, bisexual, insects is their extremely short life span, usually completed within two weeks. It is perhaps frequently forgotten by students of genetics and evolution that Drosophila is biologically comparable only with annual plants which are obligately cross-fertilized—types which are generally considered to have reached the acme of specialization. They tend to forget that woody plants, biennial and perennial herbs, and self-fertile annuals—which account for the vast majority of flowering plants—may behave very differently, both as individuals and as populations. Modern studies have shown that, in the north temperate zone, up to 80 per cent of the species in a given plant community may have some propensity for vegetative reproduction under natural conditions. Of the 1,500 species of plants studied so far, 46 per cent seem to have some faculty for producing seed without the need for cross pollination. Finally, of the 15,000 species investigated, about 33 per cent seem to be involved in polyploidy. These are phenomena unknown in populations of Drosophila.

Good had an excellent idea, but he didn't carry through. There remains a need for an impartial examination of current evolutionary hypotheses. There is a fair amount of botanical evidence, experimental and historical, which bears on the origin of species and genera. This evidence does not seem to support the neodarwinian concept of natural selection. The origin of species, or of any other taxonomic category—as distinct from the behavior of specific characters—is a matter of history and experiment, not speculation. In the literature of botany and horticulture, which has been built up over the past two hundred years, there is a wealth of historical and experimental data about individual plants and populations. It is time these data were used.—Gordon P. DeWolf, Jr., cambridge university.